(12) UK Patent Application (19) GB (11) 2 048 235 A

(21) Application No 8013420
(22) Date of filing 23 Apr 1980
(30) Priority data
(31) 79/14464
(32) 25 Apr 1979
(33) United Kingdom (GB)
(43) Application published
10 Dec 1980
(51) INT CL³
C04B 11/14
(52) Domestic classification
C1H 120 651 721 727
731 738 747 748 762 785
795 812
(56) Documents cited
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(58) Field of search
C1A
C1H
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(54) Improved Joint Cement

(57) A joint cement for filling gaps or joints in building structures comprises by weight from 35 to 95% gypsum plaster having a particle size less than 150 μm, from 0 to 64% inert mineral filler having a particle size less than 100 μm, and from 1 to 10% organic polymeric binder. The preferred plaster is hemihydrate plaster and inert fillers may be calcium carbonate talc or clay. The polymeric binder may be polyvinyl alcohol or starch.

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SPECIFICATION

Improved Joint Cement

The present invention relates to joint cements suitable for filling gaps in the surfaces of building structures, and more especially for filling the joints between adjacent wall boards in a wall or ceiling structure and providing a smooth finished surface.

Conventional joint compositions are composed of mineral filler, for example ground limestone, and binder, usually an organic polymer, together with additives intended to improve or adjust the working properties of the composition, and are mixed with the quantity of water necessary to achieve the desired working consistency. They may be sold dry or in a ready mixed condition, but in any event, after application, they dry by evaporation of the added water. In a wet or humid environment, the drying time can be excessively long, for example as much as six weeks, and completion of the building concerned will be correspondingly delayed.

It is an object of this invention to provide a joint composition which hardens relatively rapidly anc with less dependence on weather conditions than conventional compositions, but which at least maintains the working and smooth finishing properties of conventional compositions.

In accordance with this invention there is provided a joint cement for mixing with water and comprising by weight from 35 to 95% gypsum plaster having a particle size less than 150 μm, from 0 to 64% inert mineral filler having a particle size of less than 100 μm, and from 1 to 10% organic polymeric binder.

Additives such as additional filler, setting retarder for the gypsum plaster, colour and defoaming agent can be included.

By reason of the incorporation of such a rapid setting hydraulic material as gypsum plaster, the cement of this invention does not rely on evaporation of water for hardening, and gaps or joints filled with this cement can accordingly be ready for further finishing operations in a predictably short time, regardless of atmospheric conditions. Setting times can be adjusted by the use of conventional setting rate adjusters for the cementitious material concerned. Suitable setting times for these cements may be in the range 30 minutes to 6 hours, depending on the preference of the user. For example, with a cement having a setting time of 2 hours, a joint can be filled, including the application of tape, in 4 hours.

The preferred gypsum plaster for the purposes of this invention are hemihydrate plasters with a particle size below 150 μm, produced by standard processes. Such plasters naturally have setting times of the order of a few minutes and must be retarded to give the user of the cement sufficient time for application and smoothing. Conventional retarders, for example citric acid, can be used for this purpose.

Inert fillers in the context of the invention should be chemically inert and selected to provide desirable wetting and working characteristics. Calcium carbonate, for example in the form of ground limestone, is well known as a filler in conventional joint compositions, as also talc. Gypsum plaster itself fulfils a filling function, and the quantity of inert fillers can be reduced accordingly. The preferred particle size range for ground limestone is less than 100 μm. That for talc is less than 40 μm. A clay such as kaolinite or montmorillonite can be added if desired, preferably from 0 to 2% by weight.

The polymeric binder serves to strengthen the set cement, but also contributes to the working properties of the cement.

The binder should be water soluble or dispersible and the preferred polymer is polyvinyl alcohol. Starch can also be added and contributes to the working properties of the cement.

Other additions may be included such as a defoamer to avoid the formation of bubbles and colour to give the desired shade to the set cement, for example to match the ivory colour of the facing paper of gypsum board.

Preferred formulations according to the invention may be tabulated as follows:

	Percentage by Weight	
Material	*Minimum*	*Maximum*
Hemihydrate plaster	35	95
Ground limestone	0	64
Talc	0	10
Clay	0	2
Polyvinyl alcohol	1	10
Starch	0	5
Defoamer	0	3
Colour	0	1
Setting retarder	as required	

The dry cement composition according to this invention, formulated as above, has outstanding storage qualities if kept in a sealed container. For the best shelf life, it should be sealed in a bag of

substantially impermeable plastics material, such as polyethylene. It can be readily mixed with the prescribed amount of water immediately before use.

The invention enables joint cements to be prepared which, apart from the advantage of predictable and rapid setting already mentioned, possess the qualities of easy mixing with water to a smooth creamy paste, a good "wet edge", good feathering properties, good adhesion and excellent gap filling properties with minimal shrinkage. The hardened cement layer can be sanded if desired. On account of these outstanding qualities, the cements of this invention are of interest for a variety of purposes, including application by hand tools or machine, but especially were joints are to be filled, more particularly in the surfaces of building structures and in wall board structures as already discussed.

Accordingly, the invention also provides a method of filling gaps or joints in structures which comprises applying to the gap or joint a cement as defined above in admixture with water, smoothing the surface of the cement as may be necessary, and thereafter allowing the cement to set or harden in the gap or joint.

Example

The following is an example of the practice of the invention.

A dry cement formulation is made up as follows:

Material	*Weight %*
Hemihydrate plaster (see below)	43.48
Ground limestone (100% less than 100 μm)	48.30
Talc (99.9% less than 40 μm)	4.83
Bentonite (montmorillonite)	0.97
Polyvinyl alcohol (see below)	1.93
Starch (100% less than 150 μm)	0.14
Citric acid	0.06
Defoamer	0.19
Colour	0.10

The hemihydrate plaster had a particle size analysis such that 100% was less than 150 μm, 84% less than 75 μm and 40% less than 45 μm, and had an unadjusted setting time of 8 minutes. The polyvinyl alcohol had a hydrolysis value of 87—89% and a viscosity of 27—33 cp in 4% aqueous solution at 20°C.

The above formulation exhibited excellent storage properties when sealed in polyethylene bags.

For use, 100 g of the dry formulation was mixed with 47 g water to a creamy paste. The resulting cement had all the desirable working properties mentioned above and exhibited a setting time of about 2 hours.

Claims

1. A joint cement for mixing with water and comprising by weight from 35 to 95% gypsum plaster having a particle size less than 150 μm, from 0 to 64% inert mineral filler having a particle size less than 100 μm, and from 1 to 10% organic polymeric binder.

2. A joint cement according to Claim 1 comprising by weight 35—95% hemihydrate plaster, 0—64% calcium carbonate, 0—10% talc, 1—10% hydrophilic organic polymeric binder and 0—5% starch.

3. A joint cement according to Claim 2 in which the binder is polyvinyl alcohol.

4. A joint cement according to Claim 2 or 3 additionally containing 0—2% montmorillonite clay.

5. A joint cement according to Claim 2 or 3 additionally containing 0—2% kaolinite clay.

6. A joint cement according to Claim 2 or 3 additionally containing by weight 0—3% defoamer and 0—1% colour together with a setting retarder giving a setting time in the range 30 minutes to 6 hours.

7. A method of filling gaps or joints in structures which comprises applying to the gap or joint a cement according to any preceding claim in admixture with water, and thereafter allowing the cement to set or harden in the gap or joint.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1980. Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.